Claims

1. A process of separating suspended solids from a fermentation liquor by subjecting the liquor to a solids-liquid separation stage,
wherein the fermentation liquor is produced in a fermentation process for the production of a fermentation product,
which fermentation liquor comprises lignin,
wherein the solids-liquid separation stage is assisted by a treatment system,
characterised in that the treatment system comprises an anionic polymer,
with the proviso that the treatment system does not include a cationic polymer having an intrinsic viscosity (IV) of at least 4 dl/g.

2. A process according to claim 1 in which the fermentation liquor is subjected to a distillation stage wherein the fermentation product is recovered, wherein the liquor is recovered from the distillation stage as a stillage stream and then subjected to the solids-liquid separation stage.

3. A process according to claim 1 in which the fermentation liquor contains the fermentation product wherein the liquor is subjected to the solids-liquid separation stage and then passed to a distillation stage wherein the fermentation product is recovered.

4. A process according to any of claims 1 to 3 in which the treatment system comprises an anionic polymer selected from natural polymers and modified natural polymers having a high anionic charge such that the equivalent weight is below 250, and synthetic polymers formed from at least 50% by weight anionic monomers units, preferably at least 65% by weight anionic monomer units.

5. A process according to any of claims 1 to 4 in which the anionic polymer is formed from anionic monomers selected from the group consisting of (meth) acrylic acid (or salts), maleic acid(or salts), itaconic acid(or salts), fumaric acid(or salts), vinyl sulfonic acid(or salts), allyl sulfonic acid and 2-acrylamido-2-methyl sulfonic acid(or salts).

6. A process according to any of claims 1 to 5 in which anionic polymer exhibits an intrinsic viscosity of at least 4 dl/g (measured in 1 M NaCl at 25°C).

7. A process according to claims 1 to 6 in which the treatment system further comprises addition of a cationic polymer that exhibits an intrinsic viscosity below 4 dl/g (measured in 1 M NaCl at 25°C).

8. A process according to claim 7 in which the cationic polymer exhibits a charge density of at least 3 meq/g.

9. A process according to any of claims 7 to 8 in which the cationic polymer is selected from the group consisting of polyamines, amine/epihalohydrin addition polymers, polymers of dicyandiamide with formaldehyde, polymers of diallyldimethyl ammonium chloride (DADMAC), cationic starch and cationic inulin, polymers of dialkyl amino alkyl (meth) acrylates (or salts) and dialkyl amino alkyl (meth) acrylamides (or salts).

10. A process according to any of claims 7 to 9 in which the anionic polymer and cationic polymer are added sequentially, preferably employing the anionic polymer first.

11. A process according to any of claims 1 to 10 in which the dose of anionic polymer is at least 50 grams per tonne (based on dry weight of fermentation liquor).

12. A process according to any of claims 7 to 11 in which the dose of cationic polymer is at least 50 grams per tonne (based on dry weight of fermentation liquor).

13. A process according to any of claims 1 to 12 in which the treatment system further comprises addition of a siliceous material.

14. A process according to claim 13 in which the siliceous material is selected from the group consisting of silica based particles, silica microgels, colloidal silica, silica sols, silica gels, polysilicates, cationic silica, aluminosilicates, polyaluminosilicates, borosilicates, polyborosilicates, zeolites and swellable clays.

15. A process according to claim 13 or claim 14 in which the siliceous material is an anionic microparticulate material.

16. A process according to any of claims 13 to 15 in which the siliceous material is a bentonite type clay.

17. A process according to any of claims 13 to 16 in which the siliceous material is selected from the group consisting of hectorite, smectites, montmorillonites, nontronites, saponite, sauconite, hormites, attapulgites and sepiolites.

18. A process according to any of claims 1 to 17 in which the fermentation liquor is subjected to a mechanical dewatering stage during or subsequent to application of the treatment system.

19. A process according to claim 18 in which the mechanical dewatering step is selected from the group consisting of, a centrifuge, a screw press, a filter press, a belt filter press, a horizontal belt filter and a pressure filter.

20. A process according to any of claims 1 to 19 in which the treated liquor from which suspended solids have been removed are recycled and used as wash water.

21. A process according to any of claims 1 to 20 in which the fermentation liquor comprises lignin and in which the separated solids are dewatered and then subjected to a drying stage to provide a dry solid material and in which the dry solid material is used as a solid fuel.

22. A process according to claim 1 or any of claims 3 to 21 in which the fermentation liquor has not been subjected to a temperature of at least 50°C.

23. A process according to any of claims 1 to 22 in which the fermentation product is selected from the group consisting of ethanol, glycerol, acetone, n-butanol, butanediol, isopropanol, butyric acid, methane, citric acid, fumaric acid, lactic acid, propionic acid, succinic acid, itaconic acid, acetic acid, acetaldehyde and 3-hydroxypropionic acid, glyconic acid and tartaric acid, and amino acids such as L-glutamic acid, L-lysine, L-aspartic acid, L-tryptophan, L-arylglycines or salts of any of these acids.